PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 09 May 2001 (09.05.01)	
International application No. PCT/SE00/01674	**Applicant's or agent's file reference** RF 99294PC
International filing date (day/month/year) 31 August 2000 (31.08.00)	**Priority date** (day/month/year) 03 September 1999 (03.09.99)
Applicant RUDA, Fredrik	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

23 March 2001 (23.03.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Nestor Santesso
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RF 99294PC	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/SE00/01674	International filing date *(day month year)* 31.08.2000	Priority date *(day month year)* 03.09.99
International Patent Classification (IPC) or national classification and IPC7 A01J 5/007		
Applicant DeLaval Holding AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
23.03.2001	21.11.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Magnus Thorén/LS Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01674

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:
pages 1-10 . as originally filed
pages _____ . filed with the demand
pages _____ . filed with the letter of _____

☒ the claims:
pages _____ , as originally filed
pages _____ . as amended (together with any statement) under article 19
pages _____ . filed with the demand
pages 11-15 . filed with the letter of 28.09.2001

☒ the drawings:
pages 1-2 . as originally filed
pages _____ , filed with the demand
pages _____ . filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ . as originally filed
pages _____ , filed with the demand
pages _____ . filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE00/01674

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-18	YES
	Claims		NO
Inventive step (IS)	Claims	1-18	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The present invention relates to a graphical user interface, and a method for providing such an interface, for the monitoring and/or controlling of a computer controlled dairy farm system or part thereof, for a human user.

Amended claims have been issued.

The invention according to the amended claims is characterised in that the interface comprises a computeer based graphical and schematic representation of at least part of the dairy farm system, where each representation has a spacial location in relation to other objects, and wherein said spatial location in relation to another object is mapped to the spatial location of the respective represented part of the system.

The cited EP 0440313 reveals the use of a computer for a milking system, which has a key board with symbols that relate to physical entities to be controlled by an operator. These symbols do not have a related spatial location which mappes the spatial location of the represented parts of the system.

The invention is novel and not considered obvious to a person skilled in the art.
The invention is industrially applicable.

CLAIMS

1. A graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm system or part thereof, by a human user, characterized in that said graphical user interface comprises a computer based graphical and schematic representation of said dairy farm system or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having a spatial location in relation to the other object(s), wherein said spatial location in relation to other object(s) of the respective object is mapped to the spatial location of the respective represented part of said dairy farm system or part thereof.

2. The graphical user interface as claimed in claim 1, characterized in that

- each of said objects has at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system or part thereof; and

- each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system or part thereof, is chosen from the group of size, shape, color, direction, movement, amount, rate, and frequency.

3. The graphical user interface as claimed in claim 1 or 2, characterized in that said graphical user interface comprises a schematic representation of an entire dairy farm system, in which case said graphical user interface comprises

objects representing parts such as each individual cow, fence, gate or apparatus in the dairy farm system.

4. The graphical user interface as claimed in claim 3, characterized in that said graphical user interface comprises schematic status indications for at least one of said objects such as for instance if a cow has been milked or not, if a gate is opened or closed, or if an apparatus is in use or not.

5. The graphical user interface as claimed in claim 1 or 2, characterized in that said graphical user interface comprises a schematic representation of a milking machine or part thereof, or of a cow or part thereof.

6. The graphical user interface as claimed in claim 5, characterized in that said graphical user interface comprises schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

7. The graphical user interface as claimed in claim 6, characterized in that the schematic representations of the teats or teat cups are associated with respective controls for start milking or with respective status indications indicating milk yield during milking.

8. The graphical user interface as claimed in claim 6 or 7, characterized in that said graphical user interface comprises schematic representations of the teat cups as detached at spatial locations, which schematically correspond to the respective spatial locations in the milking machine, e.g. along a line.

9. The graphical user interface as claimed in claim 8, characterized in that each of the four icons schematically representing the teats of a cow, or teat cups that are attached to them, has a visual characteristic in common with the respective associated schematic representation of the teat cup as detached, e.g. along a line, in order to map each detached teat cup to its respective attached position.

10. The graphical user interface as claimed in any of claims 5-9, characterized in that said graphical user interface comprises schematic representations of an entry gate and of an exit gate, respectively, of said milking machine, at spatial locations corresponding schematically to the respective locations in the milking machine.

11. The graphical user interface as claimed in claim 10, characterized in that the schematic representations of the entry gate and of the exit gate are associated with respective controls for opening and closing the respective gate or with respective status indications indicating whether the respective gate is opened or closed.

12. The graphical user interface as claimed in any of claims 6-11, characterized in that said graphical user interface comprises schematic representations of a rear plate and of a manger, respectively, of said milking machine.

13. The graphical user interface as claimed in claim 12, characterized in that the schematic representations of the rear plate and of the manger are associated with respective controls for positioning the rear plate and the manger or with respective status indications indicating the location of the rear plate and the manger.

14. An automatic milking machine, characterized in that said graphical user interface comprises a graphical user interface as claimed in any of claims 1-13.

15. A method for providing a graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm system or part thereof, by a human user, characterized by

- displaying a computer based graphical and schematic representation of said dairy farm system or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system or part thereof, and each having a spatial location in relation to the other object(s), wherein said spatial location in relation to other object(s) of the respective object is mapped to the spatial location of the respective represented part of said dairy farm system or part thereof.

16. The method as claimed in claim 15, wherein

- each of said objects has at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system or part thereof; and

- each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system or part thereof, is chosen from the group of size, shape, color, direction, movement, amount, rate, and frequency.

17. The method as claimed in claims 15 or 16, characterized by displaying a schematic representation of a milking machine or part thereof, or of a cow or part thereof.

18. The method as claimed in claim 17, characterized by displaying schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

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Form PCT/IPEA/409 (cover sheet) (January 1998)

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International application No.
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Inventive step (IS)	Claims	1-18	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The present invention relates to a graphical user interface, and a method for providing such an interface, for the monitoring and/or controlling of a computer controlled dairy farm system or part thereof, for a human user.

Amended claims have been issued.

The invention according to the amended claims is characterised in that the interface comprises a computeer based graphical and schematic representation of at least part of the dairy farm system, where each representation has a spacial location in relation to other objects, and wherein said spatial location in relation to another object is mapped to the spatial location of the respective represented part of the system.

The cited EP 0440313 reveals the use of a computer for a milking system, which has a key board with symbols that relate to physical entities to be controlled by an operator. These symbols do not have a related spatial location which mappes the spatial location of the represented parts of the system.

The invention is novel and not considered obvious to a person skilled in the art.
The invention is industrially applicable.

CLAIMS

1. A graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm system, or part thereof, by a human user, characterized in that it comprises a computer based graphical and schematic representation of said dairy farm system, or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof.

2. The graphical user interface as claimed in Claim 1, characterized in that each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, is chosen from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

3. The graphical user interface as claimed in Claim 1 or 2, characterized in that a relation between a first and a second object of said representation is comprised among relations between a first and a second part of the dairy farm system, or part thereof, which are represented by said objects.

4. The graphical user interface as claimed in any of Claims 1-3, characterized in that it comprises a schematic representation of an entire dairy farm system, in which case it comprises objects representing parts such as each individual cow, fence, gate or apparatus in the dairy farm system.

5. The graphical user interface as claimed in Claim 4, characterized in that it comprises schematic status indications for at least one of its objects such as for instance if a cow has been milked or not, if a gate is opened or closed, or if an apparatus is in use or not.

6. The graphical user interface as claimed in any of Claims 1-3, characterized in that it comprises a schematic representation of a milking machine, or part thereof, or of a cow, or part thereof.

7. The graphical user interface as claimed in Claim 6, characterized in that it comprises schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

8. The graphical user interface as claimed in Claim 7, characterized in that the schematic representations of the teats or teat cups are associated with respective controls for start milking or with respective status indications indicating milk yield during milking.

9. The graphical user interface as claimed in Claim 7 or 8, characterized in that it comprises schematic representations of the teat cups as detached at spatial locations, which schematically correspond to the respective spatial locations in the milking machine, e.g. along a line.

10. The graphical user interface as claimed in Claim 9, characterized in that each of the four icons schematically representing the teats of a cow, or teat cups that are attached to them, has a visual characteristic in common with

the respective associated schematic representation of the teat cup as detached, e.g. along a line, in order to map each detached teat cup to its respective attached position.

11. The graphical user interface as claimed in any of Claims 6-10, characterized in that it comprises schematic representations of an entry gate and of an exit gate, respectively, of said milking machine, at spatial locations corresponding schematically to the respective locations in the milking machine.

12. The graphical user interface as claimed in Claim 11, characterized in that the schematic representations of the entry gate and of the exit gate are associated with respective controls for opening and closing the respective gate or with respective status indications indicating whether the respective gate is opened or closed.

13. The graphical user interface as claimed in any of Claims 6-12, characterized in that it comprises schematic representations of a rear plate and of a manger, respectively, of said milking machine.

14. The graphical user interface as claimed in Claim 13, characterized in that the schematic representations of the rear plate and of the manger are associated with respective controls for positioning the rear plate and the manger or with respective status indications indicating the location of the rear plate and the manger.

15. An automatic milking machine, characterized in that it comprises a graphical user interface as claimed in any of claims 1-14.

16. A method for providing a graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm

system, or part thereof, by a human user, characterized by displaying a computer based graphical and schematic representation of said dairy farm system, or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof.

17. The method as claimed in Claim 16, characterized by choosing each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

18. The method as claimed in Claim 17, characterized by displaying the computer based graphical and schematic representation of the dairy farm system, or part thereof, where a relation between a first and a second object of said representation is comprised among relations between a first and a second part of the dairy farm system, or part thereof, which are represented by said objects.

19. The method as claimed in any of Claims 16-18, characterized by displaying a schematic representation of a milking machine, or part thereof, or of a cow, or part thereof.

20. The method as claimed in Claim 19, characterized by displaying schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons

representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

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(71) Applicant *(for all designated States except US)*: **DELAVAL HOLDING AB** [SE/SE]; Box 39, S-147 21 Tumba (SE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **RUDA, Fredrik** [SE/SE]; Odlingsvägen 18, S-147 50 Tumba (SE).

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

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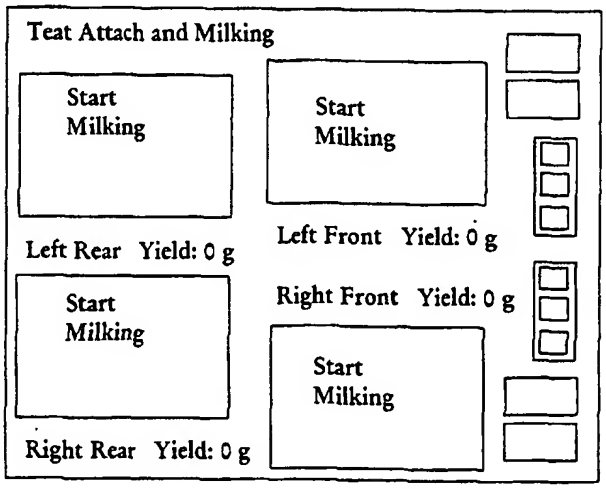
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: GRAPHICAL USER INTERFACE AND METHOD RELATED THERETO



(57) Abstract: A graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm system, or part thereof, by a human user, is disclosed, which comprises a computer based graphical and schematic representation of said dairy farm system, or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof. Each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, is preferably chosen from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

WO 01/17336 A1

GRAPHICAL USER INTERFACE AND METHOD RELATED THERETO

TECHNICAL FIELD OF THE INVENTION

The present invention generally relates to dairy farming and particularly to a graphical user interface, and a method related thereto, for enabling a human user to monitor and/or control a computer controlled dairy farm activity such as for instance automated or semi-automated machine milking.

DESCRIPTION OF RELATED ART AND BACKGROUND OF THE INVENTION

In modern dairy farm industry there are continuous research and development activities in order to improve the efficiency of various activities such as machine milking, which, inter alia, involves increased milk yield, reduced milking time, while still maintaining good udder health. Other activities include feeding, breeding, cleaning and other treatments.

A major trend in this respect is an increased degree of automation of the various activities. For instance, machine milking may be performed by controlling milking robots, more or less manually, or it may even be performed completely automated. In both cases, at least some of monitoring, controlling, regulating, maintaining, trouble shooting, etc., of the milking machine or robot, by a user or operator of the machine, is needed whereby communication between the user and the machine is realized through an input/output means, e.g. a computer screen and a keyboard, a so-called pointing screen, or through more conventional controls such as levers and knobs, of the machine. Very few considerations in respect of designing these controls, and particularly those represented on computer screens, have been taken, which have resulted in poor, often complex, designs. Computer screens often display the information in plain text and various actions are

typically performed by pressing a number, often arbitrary chosen, followed by pressing a "return" button or the like.

A problem in this respect, particularly in relation to advanced complex monitoring and controlling associated with computer controlled communication, but also concerning simpler conventional controls, is that it might be a hazardous task for the user not to make any mistakes in the communication with the machine or when interpreting received information, which in turn may lead to fatal errors in the operation of the machine. The more complex the control means is and the shorter time the human user has available, the higher is the probability for the user to perceive information erroneously and/or perform erroneous actions.

In a dairy farm system, there are some particular concerns that have to be dealt with. Firstly, a dairy farm comprises a particular environment in that it includes living animals. In such an unpredictable or uncontrollable environment emergency situations may arise such as animals getting jammed in a gate or teats getting caught in a teat cup etc. In such circumstances, an activity such as opening a gate or detaching a teat cup is needed to be performed extremely rapidly. The user of the dairy farm system, being under stress, thus performs an action, i.e. the first action that comes to the user's mind which is intuitively believed to be the right action. The risk of faulty actions is in this respect considerable high.

Secondly, the problems are probable to arise for a user which is not familiar with the system such as a substitute or the like or for a user confronting a part of the system which normally is not used, e.g. a part used for infrequent operation and maintenance activities, or the like.

Consequently, in an automated dairy farm there is an urgent need of a graphical user interface for controlling various activities,

which is easy to understand, logical and enables a user to perform an action in an intuitive manner.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a graphical user interface in a computer controlled dairy farm system such as a machine milking facility, for monitoring and/or controlling said system. Said graphical user interface should be arranged so as to minimize the cognitive burden that the user is exposed to during use of, e.g. communication with, the system, in order to hereby minimize the risk of erroneous actions.

In this respect, it is a further object of the invention to be integratable in existing computer controlled dairy farm systems.

It is yet a further object to provide such an inventive interface for effective, accurate, precise and reliable use of said system.

These objects among others are, according to one aspect of the invention, fulfilled by a graphical user interface as claimed in Claim 1.

A further object of the present invention is to provide a method for displaying a graphical user interface in a computer controlled dairy farm system, or part thereof, for communication from the system to a human user and/or from the user to the system.

Consequently, there is according to a second aspect of the present invention provided a method as claimed in Claim 16.

An advantage of the present invention is that it provides for a reliable operation of the computer controlled dairy farm system.

Further characteristics of the invention, and advantages thereof, will be evident from the following detailed description of

embodiments of the invention, which are shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description of embodiments of the present invention given hereinbelow and the accompanying Figs. 1-3 which are given by way of illustration only, and thus are not limitative of the invention.

Fig. 1 displays schematically a graphical user interface according to a first embodiment of the present invention.

Fig. 2 illustrates schematically a graphical user interface according to a second embodiment of the present invention.

Fig. 3 illustrates schematically a graphical user interface according to a third embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

In the following description, for purposes of explanation and not limitation, specific details are set fourth, such as particular hardware, applications, techniques, etc. in order to provide a thorough understanding of the present invention. However, it will be apparent to one skilled in the art that the present invention may be practiced in other embodiments that depart from these specific details. In other instances, detailed descriptions of well-known methods, protocols, apparatuses, and circuits are omitted so as not to obscure the description of the present invention with unnecessary details.

While the present invention is to be employed for communication between a human user and an arbitrary computerized dairy farm system, it will mainly be described in relation to a milking

machine system, which typically involves, for each animal milking unit, a clawpiece and a cluster of four teat cups connected to the clawpiece. Each teat cup has a rigid shell and an internal flexible liner. This liner has a topmost mouthpiece and a body part inside the shell body. The liner extends through the bottom of the shell body as a short milk tube. This tube is connected to clawpiece and thence, by way of a long milk tube, to a source of steady vacuum. An annular space, between the teat cup shell and the teat cup liner, is connected to the clawpiece by a pulse tube and thence to a source of pulsating vacuum. A milk meter may be attached to the downstream end of the long milk tube.

Alternatively, the clawpiece and the cluster may be dispensed with, whereby each teat cup is connected directly to a respective long milk tube, and each long milk tube is connected to the vacuum source.

For milking, the four teat cups are placed around the animal's teats, the liner mouthpiece of each teat cup being fitted over the respective teat. The teat cups are held in position during the milking by adhesion, due to the steady vacuum applied for the milking. The pulsating vacuum applied between the teat cup liner and shell causes the liner body to dilate and contract again, thus promoting the flow of milk by simulating suckling. After completion of the milking, the teat cup cluster is removed from the animal's teats, either manually or by automatic means.

The present invention comprises a design of a graphical user interface and interactions through said interface that employs the principle of natural mapping.

Mapping is a technical term, which refers the relation between two things; in the present case the graphical user interface and the automated dairy farm system, e.g. the milking machine. Natural mapping means that this relation should be natural, logic and

simple. If a correct natural mapping is employed, there is no need for diagrams, labels or wordy instructions, see e.g. D.A. Norman in The Psychology of Everyday Things, Basic Books, 1988.

Thus, the present invention comprises a graphical user interface for monitoring and/or controlling of a computer controlled dairy farm system by a human user comprising a computer based graphical and schematic representation of said system, of a machine or part of a machine thereof, of a fence or a gate thereof, or of an animal, or part thereof, at the dairy farm, featuring that said representation is employing the principle of natural mapping.

In this respect said graphical and schematic representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof.

Furthermore, each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, is preferably chosen from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

Alternatively, a relation between a first and a second object of said representation is comprised among relations between a first and a second part of the dairy farm system, or part thereof, which are represented by said parts.

A few embodiments of the present invention will now be described in relation to a milking robot installation. They constitute different graphical user interfaces, or screen windows that all represent the robot, part thereof or gates used for the milking

activities, and/or the cow, or part thereof, in a graphical manner that eliminate, or at least reduce the probability of faulty conception by the user, by the employment of natural mappings.

A first embodiment of the present invention will now be described with reference to Fig. 1, which schematically illustrates a graphical user interface used for e.g. monitoring or controlling of a milking machine of the above depicted type during a particular phase of the milking denoted "Teat attach and Milking". Here, the four teats of the cow are represented graphically by four boxes, labeled "Start Milking", located relative each other as they do in reality, i.e. with a larger distance between the front teats than between the back teats. This is a fact well known to every single farmer, and hence the risk for making a mistake while identifying the teats for further handling such as milking, is minimized. When viewing the interface and the milking machine, respectively, from the same position, the cow and the graphical teat representation should preferably have their fronts facing towards the same direction, i.e. towards the right in the illustrated case. But in either case, the risk of making a mistake is severely reduced.

Furthermore, each teat representation has a respective status indication associated therewith, which indicates whether the teat is being milked or not. In Fig. 1 the representations show "Start milking" and the teats are thus not being milked. By activating the milking manually, e.g. by pressing the "Start milking" buttons, or whether it is performed automatically, the representations are starting to indicate the milk mass flow in real time. Next to each representation, there is a status indication of the milk yield (in grams), i.e. accumulated collected milk, from the respective teat during the milking.

The labels "left rear", "left front", "right rear" and "right front" are redundant information and may be removed, whereby only

the naturally mapped graphical representation of the teat formation is sufficient for identifying the respective teat. This is an example of a simple but excellent natural mapping.

Considering next Fig. 2 which illustrates a graphical user interface according a second embodiment of the present invention corresponding to an adjustment phase, i.e. for teat cup testing, of the milking machine. At this stage, the teat cups are located along a line in a magazine at one side of the milking machine. The interface has graphical representations of the teat cups in this location and the coupling between the respective positions, i.e. in its magazine and attached to teat, is shown by color-coding of the respective representations. Thus, there is a mapping between the teat cup in its magazine position and in its position during milking.

Alternatively, the coupling may be indicated by arrows or movement directions for how respective teat cup is moved during teat attachment and detachment, which may be activated automatically or by the user, e.g. by clicking, double clicking or movement through the so-called drag-and-drop technique of the respective graphical representation.

Considering next Fig. 3 which illustrates a graphical user interface according a third embodiment of the present invention corresponding to an other adjustment phase of the milking machine, i.e. a stall control, for adjusting of manger position, a rear plate, and entry and exit gates, respectively.

Here, the rear plate, i.e. a plate for collecting cow excrements, may be in either of two positions; in a "Pull Back" position wherein it is out of use and removed from the stall enabling the cow to enter the stall from left, i.e. through an entry gate, or in a "Release" position wherein it is positioned behind the cow, when the cow is in the stall, for collecting of excrements. The

rear plate is moved as indicated by the arrows, i.e. to the left when it is pulled back and to the right when it is released. The position of the manger is utilized for adjustment of the stall length to each individual cow. This is performed by variably position the manger; more to the left for shorter cows and more to the right for longer cows, as indicated by the scroll bar (and the arrows in the Figure). Finally, the entry and exit gates have push buttons for opening and closing. The gates are preferably opened from the far side of the user and closed from the close side, as indicated by the positions of the respective push buttons in the Figure.

Furthermore, the respective positions of the rear plate, the manger and the gates correspond to their positions in reality, i.e. with the rear plate and the entry gate to the left and the manger and the exit gate to the right (from the user's intended viewpoint).

A fourth embodiment of the present invention (not shown in the Figures) comprises a graphical user interface that shows an entire dairy farm in a perspicuous manner, with position indications for each individual cow, fence, gate and apparatus, and status indications such as if cows have been milked or not, if gates are opened or closed, and if apparatuses are in use or not.

Other machines or processes at a dairy farm may off course be equally suited for the implementation of a computer controlled, controlling and/or informing graphical user interface that makes use of the invention by employing natural mappings.

In summary several embodiments of the present invention have been disclosed, which illustrate the various characteristics of the present invention.

It will be obvious that the invention may be varied in a plurality of ways. Such variations are not to be regarded as a departure from the scope of the invention. All such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the appended claims.

CLAIMS

1. A graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm system, or part thereof, by a human user, characterized in that it comprises a computer based graphical and schematic representation of said dairy farm system, or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof.

2. The graphical user interface as claimed in Claim 1, characterized in that each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, is chosen from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

3. The graphical user interface as claimed in Claim 1 or 2, characterized in that a relation between a first and a second object of said representation is comprised among relations between a first and a second part of the dairy farm system, or part thereof, which are represented by said objects.

4. The graphical user interface as claimed in any of Claims 1-3, characterized in that it comprises a schematic representation of an entire dairy farm system, in which case it comprises objects representing parts such as each individual cow, fence, gate or apparatus in the dairy farm system.

5. The graphical user interface as claimed in Claim 4, characterized in that it comprises schematic status indications for at least one of its objects such as for instance if a cow has been milked or not, if a gate is opened or closed, or if an apparatus is in use or not.

6. The graphical user interface as claimed in any of Claims 1-3, characterized in that it comprises a schematic representation of a milking machine, or part thereof, or of a cow, or part thereof.

7. The graphical user interface as claimed in Claim 6, characterized in that it comprises schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

8. The graphical user interface as claimed in Claim 7, characterized in that the schematic representations of the teats or teat cups are associated with respective controls for start milking or with respective status indications indicating milk yield during milking.

9. The graphical user interface as claimed in Claim 7 or 8, characterized in that it comprises schematic representations of the teat cups as detached at spatial locations, which schematically correspond to the respective spatial locations in the milking machine, e.g. along a line.

10. The graphical user interface as claimed in Claim 9, characterized in that each of the four icons schematically representing the teats of a cow, or teat cups that are attached to them, has a visual characteristic in common with

the respective associated schematic representation of the teat cup as detached, e.g. along a line, in order to map each detached teat cup to its respective attached position.

11. The graphical user interface as claimed in any of Claims 6-10, characterized in that it comprises schematic representations of an entry gate and of an exit gate, respectively, of said milking machine, at spatial locations corresponding schematically to the respective locations in the milking machine.

12. The graphical user interface as claimed in Claim 11, characterized in that the schematic representations of the entry gate and of the exit gate are associated with respective controls for opening and closing the respective gate or with respective status indications indicating whether the respective gate is opened or closed.

13. The graphical user interface as claimed in any of Claims 6-12, characterized in that it comprises schematic representations of a rear plate and of a manger, respectively, of said milking machine.

14. The graphical user interface as claimed in Claim 13, characterized in that the schematic representations of the rear plate and of the manger are associated with respective controls for positioning the rear plate and the manger or with respective status indications indicating the location of the rear plate and the manger.

15. An automatic milking machine, characterized in that it comprises a graphical user interface as claimed in any of claims 1-14.

16. A method for providing a graphical user interface for the monitoring and/or controlling of a computer controlled dairy farm

system, or part thereof, by a human user, characterized by displaying a computer based graphical and schematic representation of said dairy farm system, or part thereof, where said representation comprises objects, each of which represents a respective part of said dairy farm system, or part thereof, and each having at least one associated physical property, wherein each said at least one physical property associated with the respective object is comprised among physical properties of the respective represented part of said dairy farm system, or part thereof.

17. The method as claimed in Claim 16, characterized by choosing each said at least one physical property which is comprised among the properties of the respective represented part of said dairy farm system, or part thereof, from the group of spatial location, size, shape, color, direction, movement, amount, rate, frequency and distance from other objects.

18. The method as claimed in Claim 17, characterized by displaying the computer based graphical and schematic representation of the dairy farm system, or part thereof, where a relation between a first and a second object of said representation is comprised among relations between a first and a second part of the dairy farm system, or part thereof, which are represented by said objects.

19. The method as claimed in any of Claims 16-18, characterized by displaying a schematic representation of a milking machine, or part thereof, or of a cow, or part thereof.

20. The method as claimed in Claim 19, characterized by displaying schematic representations of the teats of a cow, or teat cups that are attached to them, by four icons located schematically with a longer distance between the icons

representing the front teats or teat cups and a shorter distance between the icons representing the back teats or teat cups.

1/2

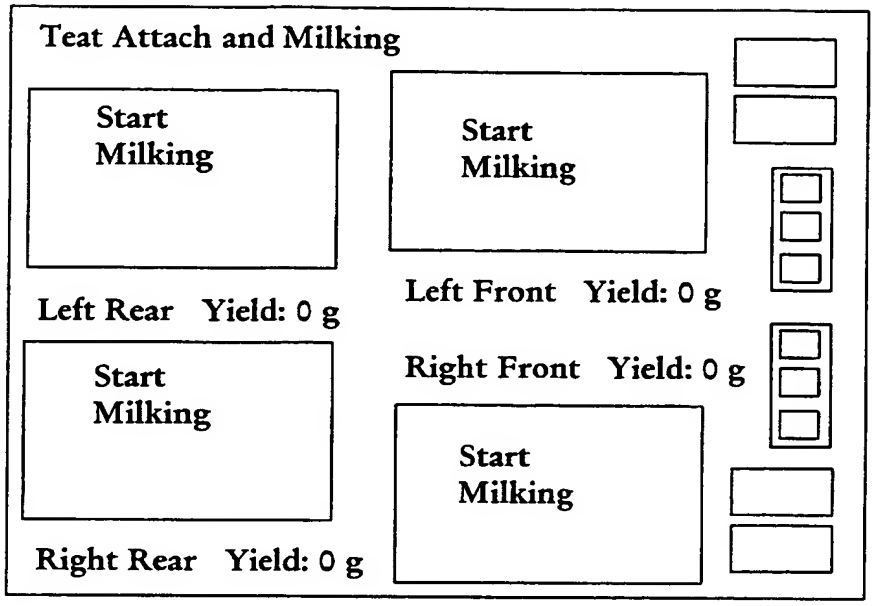

Teat Attach and Milking
Start Milking
Start Milking
Left Rear Yield: 0 g
Left Front Yield: 0 g
Start Milking
Right Front Yield: 0 g
Start Milking
Right Rear Yield: 0 g

Fig. 1

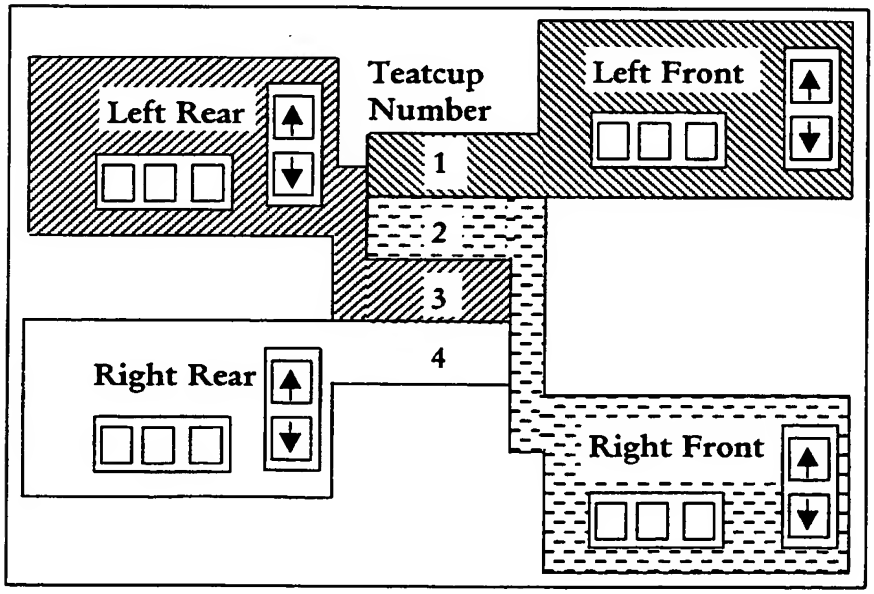

Left Rear
Teatcup Number
Left Front
1
2
3
4
Right Rear
Right Front

Fig. 2

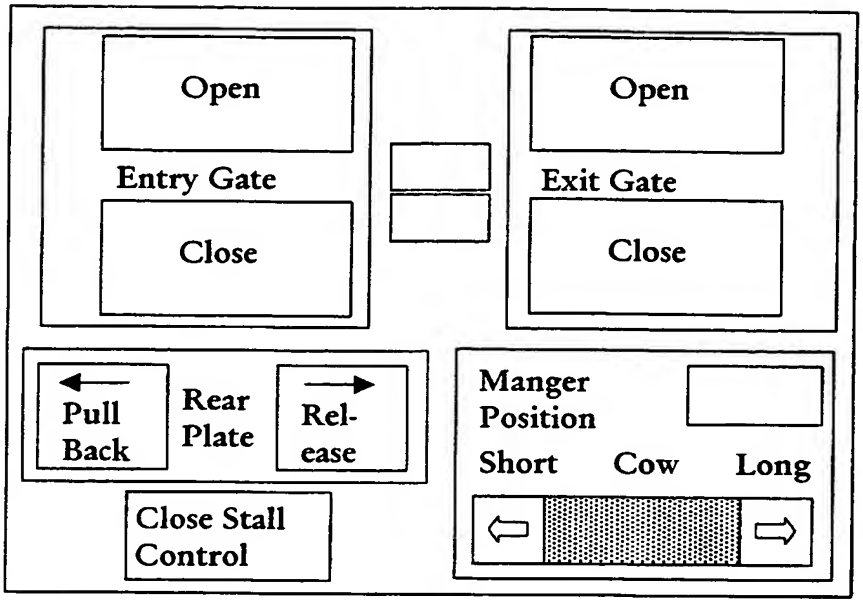

Open
Entry Gate
Close
Open
Exit Gate
Close
Pull Back
Rear Plate
Rel-ease
Close Stall Control
Manger Position
Short
Cow
Long

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01674

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A01J 5/007
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 5198976 A (FORM ET AL), 30 March 1993 (30.03.93), column 1, line 49 - line 65; column 4, line 56 - line 60, figures 1,2	
A	US 5355439 A (BERNSTEIN ET AL), 11 October 1994 (11.10.94), column 4, line 58 - line 63; column 10, line 28 - line 38; column 14, line 63 - column 15, line 30, figures 6-8	

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2000	07 -12- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Magnus Thorén/CF Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/11/00

International application No.
PCT/SE 00/01674

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